

# BAG SHELTER CATERPILLARS AND THEIR HABITS\*

By Mrs. M. B. MILLS, Merredin.

## PART 2

On May 26, 1950, I decided to collect a small number of bag shelters and attach them to trees nearer the house, as, so far, I had not been able to observe the caterpillars leaving the bag shelters on the trees to descend to the ground to find places in which to pupate. Once they left the trees no trace of them could be found, apparently very little silken thread was used when leaving the trees. On the other hand in the case of the Ground-nesting Caterpillars a clearly defined silken trail is left, shimmering in the sunlight, and by following it carefully one may find the caterpillars if it leads over soft earth.

Although I had watched and waited patiently I had not yet seen the Bag Shelter Caterpillars leave their bags, and now, as rain was threatening, I renewed my efforts.

The sky was dark and overcast as I set out with a companion, taking with us a length of rope and a long pole. I knew where there was a large bag, having kept it under observation for some time past; it contained a large number of well-grown caterpillars. Unfortunately, it was high up in a jam tree, on a slender branch about 15 ft. from the ground, but after some difficulty it was brought to the ground without harm.

The rain was falling heavier now, and we lost no time in collecting two other small bags within easy reach on a jam tree. There was a rather large third bag on a jam tree almost bare of leaves 5 yards away; from it a thick silken trail led down the tree across the ground and up the other tree, where two new bags had been made.

The caterpillars had apparently been leaving the defoliated tree for some time to seek food on the tree nearby, travelling to and fro on the silken trail, finally, perhaps, dividing into two lots and making new bags.

Later, at home, I examined the large and heavy bag to see its contents. The silken threads of which it was made were very strong and tough, a sharp knife being necessary to make an opening. It was packed with east skins and "dirt," but instead of the large number of caterpillars I expected to see, there was only one large one, which vainly tried to hide under skins and dirt. It was caught and put into the box with the others. The caterpillars had left the tree on which this bag had been, leaving no noticeable silken trail.

The other two bags collected contained a number of caterpillars, which could be seen without cutting the bags open.

\**Ochrogaster contraria* (Walker). The author's use of the vernacular names, Bag Shelter Caterpillars and Ground-nesting Caterpillars, is explained in vol. 3, no. 3, p. 61.

The bags were transferred on to jam trees near the house, being tied on to branches with twine. The caterpillars settled down in their new surroundings, coming out to feed at evenings, although the weather was turning cold.

On May 29, at noon, a bitterly cold day with showers, some caterpillars were gathered outside on the bags. June 1 at 9.50 p.m., the caterpillars at one bag ascended the branch to feed on the leaves. The following day was warm and sunny with the caterpillars clustered outside the bag in the warm sunshine.

On the evening of June 4 the caterpillars spent some time weaving silken threads about the bag, setting off at 9 o'clock to feed on the leaves. Next morning, which was sunny, the caterpillars were again building up the bag; that evening at 9.30 they ascended the branch to feed. The four following days and evenings were spent in the same manner.

Light, continuous rain was falling with little wind on the evening of June 10. The caterpillars came out to feed, climbing the wet branch to the leaves, which were wet and heavy with droplets of water, but it made no difference to the feeding caterpillars. Next evening was cold and frosty, the caterpillars remained in the bag. Then for eleven evenings the caterpillars left the bag to feed, usually between 9.30 p.m. and 9.50 p.m. They were fine specimens, varying in size, with some just over 2 inches in length.

On June 23, after rain, and the evening clear and frosty, the caterpillars remained in the bag. Next morning a heavy frost had fallen.

On June 25, at midday, some caterpillars were out on the bag weaving silken threads about it. They were not seen out on the leaves that evening. The following evening at 7.30, 17 caterpillars were just leaving the bag, starting to ascend the tree. The weather was warm and calm and it continued to be so for 3 more evenings. The caterpillars came out as previously to feed.

But on June 30 when there was a very heavy frost the caterpillars remained in the bag, coming out at 2 o'clock in the afternoon; the day was very cold with a bitter south wind. The caterpillars ascended the tree in the sunshine to feed. That night another heavy frost fell and the caterpillars did not come out.

On July 2 it was very cold, and some caterpillars came out at noon; in sunshine to feed; none ventured out at evening, which was frosty. The following day the weather changed from severe frosts to warm rainy weather; the caterpillars then emerged at 7.30 p.m. to feed, apparently not minding the warm showers. On July 4 and 5 the weather continued to be warm and showery, with the caterpillars coming out to feed as usual.

July 6 was a clear, cold evening; the caterpillars stayed in the bag; in the morning a severe frost had fallen. Again the caterpillars ascended the tree at noon to feed. The next two evenings were very cold, the caterpillars were not seen out then, but ascended the tree in afternoon sunshine to feed. On July 8 at 7.30 p.m. with

the evening chilly but not frosty, the caterpillars set off up the branch to feed. The following evening was cloudy and warm, with a promise of showers. At 7.30 the caterpillars were gathered on the bag weaving silken threads; a few minutes past 9 o'clock they ascended the tree to feed.

Until July 23 the caterpillars kept up the routine of leaving the bag at about 7.30 p.m. to spend almost an hour weaving silken threads about it, then setting off up the branch to feed, returning between 9.30 p.m. and 10.45 p.m. The weather during this period was mild and dry, with only a few light showers and two light frosts followed by sunny days.

After that the caterpillars apparently abandoned their bag. They were not seen again, nor did they leave any trace of their departure.

Other Bag Shelter Caterpillars kept in a box together with their bag, appeared to be doing well. On a day early in June the caterpillars came out of their bag and gathered on top of it, as if enjoying the lovely sunshine which slanted across the top of the box and on to their bag. They moved about weaving silken threads over the bag. The box was kept in a sheltered position and each day fresh jam leaves were put into it for the caterpillars to feed on. Usually they came out of the bag at evening to feed if it was not too cold or frosty. If the evening was very cold the caterpillars would come out to feed during the daytime.

It was late in September before the caterpillars had all vacated the bag and buried under sand in the box, making a rather rough silken cocoon.

Usually the Bag Shelter Caterpillars abandon their bags during April or May, to seek suitable places on the ground in which to pupate, but occasionally a few bags may be found containing caterpillars until later in the year. The reason for this is unknown to me.

In November moths began to emerge from the cocoons and clung to the gauze-wire sides of the box.

On November 22 at 7.15 p.m. two female moths, which had emerged the previous evening and were placed in a small container, began to lay eggs which were surrounded by fluffy scales from their bodies. For the small size of the moths there was a considerable amount of fluffy scales to cover the eggs. After the eggs were laid the moths were released, and shortly afterwards flew away.

The female moth measures approximately  $1\frac{3}{4}$  inches across the wings when fully expanded. The body is shorter and stout, just over  $\frac{3}{4}$  inch in length. The head, tufted with fine hairs, and the wings with a small white spot on them, are a light fawn to silver grey in colour. The body is dull brown, segmented, and covered with fine short hairs. Encircling the end of the body is a band, approximately  $\frac{1}{4}$  in. in width, of tightly packed fawn-coloured scales, which are freely disengaged as the eggs are being laid, covering them in a compact fluffy mass.



Of the Bag Shelter Caterpillars kept in the box in clean sand without dry leaves and the box left in a sheltered place, all but two out of about 30 caterpillars emerged as moths.

Ground-nesting Caterpillars kept in a box with soil taken from a fallow paddock with dry jam leaves added, were less successful. Of 10 caterpillars placed in the box only five emerged as moths. The other five died before reaching the moth stage. Some had begun making cocoons; weevils were present in other fully-formed cocoons, with a hole made into the bodies of the caterpillars; one caterpillar was infected with a white patch of fungus spreading over its body. The fungus was also present on some dry leaves in the box. The box had been left out in all weathers, protected only from frosts and rain or hot sunshine.

Other Ground-nesting Caterpillars, in a gauze-wire cage built around a jam tree under natural conditions, had not fared so well either. About half their number emerged as moths.

Of a large number of Bag Shelter and Ground-nesting Caterpillars under observation in natural surroundings well covered with jam and wattle trees the following notes were made:

There appeared to be about equal numbers of small, light coloured compact masses of shelters on twigs or in forks of jam or wattle trees, as there were small, light coloured fluffy nests at, or near to, the butts of these trees.

Close observation over a long period of the caterpillars which hatched out of eggs laid on twigs or in the fork of a tree and those that hatched from eggs laid on the ground near or at the butt of the tree and their later habits give me reason to think that although both lots of caterpillars are very similar in appearance and habits, they are not quite the same.

For instance: It was noted that at no time from the period of hatching to the time of pupating, did the Bag Shelter Caterpillars make any kind of a ground nest at, or near to, the feeding trees. When they abandoned the bag shelter it was to disappear entirely. Only one lot, already mentioned, was found about a hundred yards from their bag shelter travelling in single file away from sheltering trees and bush on to cultivated land.

Some experiments were also made as well to supplement the observations.

Early in the year (February 15, 1950) a bag shelter was removed from a tree and placed on the ground at the butt of another tree. This was done to see if the caterpillars would carry on life as the Ground-nesting Caterpillars do.

Next morning, silken threads led from the bag shelter up the trunk of the jam tree. On February 17 the caterpillars were not to be seen. The following morning, on looking into the bag it was found to be empty of caterpillars. Then on a branch several feet up in the tree a bag was seen in a fork. There was no bag on the tree previously. In the new bag shelter 27 caterpillars were

counted. They continued living in the bag and feeding on leaves until vacating the bag to pupate.

On February 20 another small bag shelter was collected and left on the ground at the butt of a jam tree. That evening the caterpillars in it ascended the tree but did not return down the silken threads left by them to the bag. They remained up the tree grouped in a fork. Later they were fiercely attacked by small black ants. I then removed the bag from the ground and secured it at the fork with twine, and soon afterwards the caterpillars moved into it, using it from then on.

Yet another bag shelter was tried out. This was tied to a jam tree about a foot up from the ground. During the morning 13 caterpillars came out to feed, feeding on a few leaves placed near the bag. Later they ascended the tree and then returned to the bag. Next morning the caterpillars left the bag and ascended the tree, where they grouped in a fork. The following day they did not return to the bag, but remained gathered at the fork. The morning after they were still in the fork apparently making no effort to return to their bag shelter near the ground.

The bag was then removed from this position and secured to the fork about an inch from the caterpillars. Within five minutes they ascended the short broken jam stick to the bag, moving about on it as though seeking an entrance, and finally disappearing into the bag through some small holes. As the days passed the caterpillars weaved silken threads about the bag, apparently settling in.

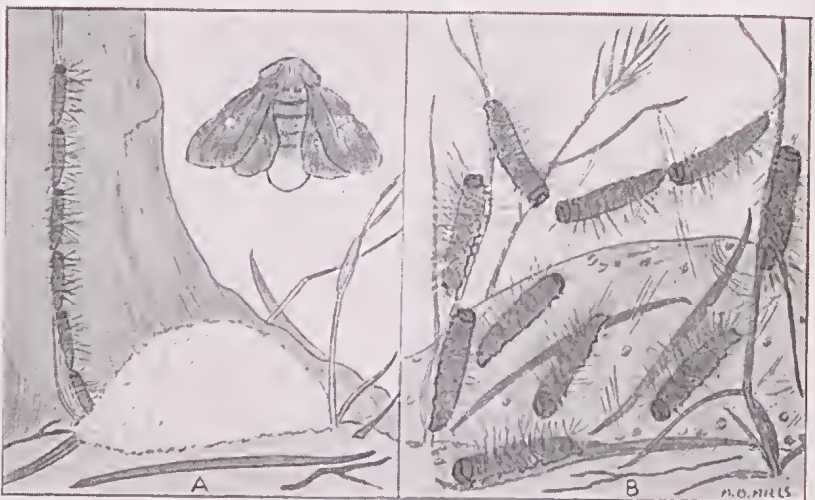


Fig. 1—A: Young Ground-nesting Caterpillars emerging from their fluffy nest at the butt of a jam tree to ascend the tree and feed on its leaves. Inset: Female moth. B: Ground-nesting Caterpillars, about half-grown, building up their nest by attaching silken threads to the nest, grass and leaves. Half natural size.

Later they left the bag, dividing into two lots and made two new bag shelters above the old one in the same tree.

During my observations I have removed many bag shelters from jam or wattle trees to trees nearer my home, and providing the bags were secured to a branch near the top of the trees the caterpillars appeared to settle down and accept the new positions.

Of the Ground-nesting Caterpillars, they apparently make a ground nest exclusively and the eggs, covered with light coloured fluffy scales, are laid at the hutt of, or near to, jam or wattle trees. After the eggs hatch the tiny caterpillars make their way up the tree, usually at evening to feed on the leaves, later they return to the ground nest, following the fine silken threads which they leave as they proceed in single file.

As time goes by and the caterpillars grow bigger they continue to ascend the tree to feed and spend a part of their time building up the ground nest, weaving silken threads about it and to grass or leaves at the nest. At times as they work a number of caterpillars will hang suspended by silken threads in mid-air, as they attach other threads to grass heads. If there are a large number of caterpillars in the nest it becomes very big, sometimes up to 14 inches in diameter and raised several inches from the ground. "Dirt" and cast skins from the caterpillars' bodies litter the nest.

Ants often intercept and attack them while they are ascending or descending the tree, the caterpillars then form into a group, remaining massed until the ants become tired of darting at the hairy mass and leave them. Spiders prey on them and will at times destroy a whole nest of tiny caterpillars.

About the months of April and May when the caterpillars are fully grown, they abandon the nest, setting off in a long processionary line seeking a place in which to pupate. After travelling awhile in single file, a caterpillar may branch off with others following, making a second processionary line (Fig. 2).

I have seen a single line of caterpillars branch off into as many as 23 other lines of caterpillars. As they pass vegetation, one, or a small number of caterpillars will drop out from the line and move in underneath the grass tufts or nettles to bury themselves under leaves and soil. If the silken trails left by the caterpillars are closely followed up, they gradually become less distinct and eventually disappear. This is due to individual caterpillars dropping out from the processionary lines to hide under vegetation and soil or continuing on alone. As many as a dozen caterpillars may be travelling alone, parallel, a few yards apart. Some of them can be found, alone, or in small numbers under vegetation, a distance from the abandoned nest. The furthest ones which I found were 185 yards from the nest, with others near that distance.

After they bury under the soil the caterpillars apparently remain there, later to begin making a rather loose silken cocoon, from which the moths eventually emerge (usually in November in captivity).



The females are large, handsome brown moths, the males being smaller. The female measures approximately 2½ inches across the expanded wings (the specimen had dried very brittle, making exact measurement difficult), wings folded against the body, from head level, 17-16 inch; stout body, 1¼ inches in length. Head tufted and hairy, brown with a sprinkling of light brown hairs. Wings, deep glossy brown, veined, with a distinct white spot on each upper and lower one. Orange and brown segmental body ending in a distinct-

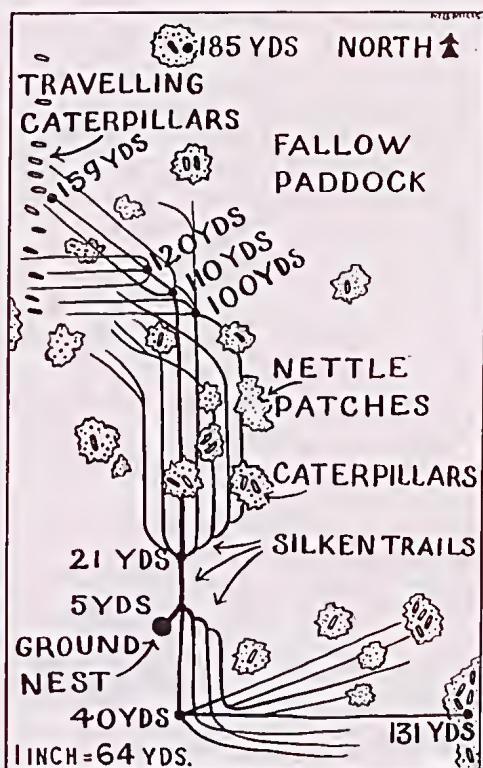


Fig. 2—Chart showing how the Ground-nesting Caterpillars travel after leaving their nest to find suitable places in which to pupate.

tive very light fawn to white colour. Under part of the body hairy, brown with a touch of orange. Encircling the end of the body is a band, approximately 0.3 in. wide, of tightly packed white to light fawn-coloured scales. These are disengaged from the body as the eggs are laid, covering them in a fluffy mass. The male moth is small and brown with white or silver marked wings; there is no light colour at the end of the body.

Of the many nests of the grey hairy caterpillars which I have had under observation over a long period, with notes made from day to day, at no time have I found the Ground-nesting Caterpillars

attempting to build a bag in a tree; they made their nests on the ground from the time of hatching to the time of pupating. The caterpillars appear to be more hairy than the Bag Shelter ones, while their female moth is much larger and of a different colour.

Since the above notes were written I kept a number of Ground-nesting Caterpillars in captivity, in a roomy box fitted with gauze-wire sides. After being placed in the box (two lots from different nests) they first hid under dry jam leaves and sand on the bottom of the box. Later, at evening, they set off in single file about the box and ascended the sides. After a short time they settled down and fed on fresh jam leaves; when satisfied they chose a place under the dry leaves and sand, massing there completely hidden from sight. From then on, each evening the caterpillars emerged from under the leaves between 6.30 and 7.30 to feed.

Leaves were kept fresh for them by placing them in a small jar of water, the small branches were firmly bound around with cloth to avoid the possibility of caterpillars falling in the water when descending the branches. A small forked stick was left leaning against the jar and on to the branches. It was interesting to find that the caterpillars usually ascended the stick to the branches and then up to the leaves. They were very easy to keep in the box. At times the door was not securely fastened, but no attempt was made to escape. After a time cast skins littered the nest and the caterpillars appeared to be contented.

While in captivity no attempt was made by the Ground-nesting Caterpillars to build a bag in the branches. After each evening meal they returned to their nest now threaded over with silk under the leaves on the bottom of the box.

When fully fed they buried under the sand; later in the year, in November, to emerge as moths.

Eggs laid by the females while in captivity were always deposited on the sand at the bottom of the box, in, or near a corner. The eggs were covered with fluffy scales.

In comparison to the caterpillars above, a small silken bag containing about 43 caterpillars collected on a big, old gum tree, and placed in a roomy gauze-wire cage, were most difficult to keep in captivity, even the smallest holes had to be attended to as the restless Bag Shelter Caterpillars continually moved about the cage. Little time was spent on the bottom of the cage, the caterpillars continually attempting to climb upwards. Their bag was fixed in a branch in the cage; at times they settled in it, but finally abandoned it altogether.

After several days the caterpillars grouped up on the leaves (not remaining at all on the bottom of the cage) and commenced to build a frail silken bag, later moving into it and at last appearing to settle down.

Each time fresh leaves were placed in a tall bottle in the cage the bag shelter, full of caterpillars, was carefully removed from



its nesting place among the stale leaves and fixed in a fork in a branch with fresh leaves.

After a time, usually at evening, the caterpillars emerged from the bag to spend some time weaving silken threads about it and on to leaves; later they moved off up the branch to feed on the gum leaves, afterwards returning to their bag shelter.

Two other bags of almost fully grown Bag Shelter Caterpillars collected from gum trees and kept in captivity were very restless, continually moving about the box. After a few days caterpillars from each bag began to build silken bags on the highest parts of the box, one on the side, the other on the top, under the lid of the box. Finally they moved into their new bag shelter. After a time they abandoned the bag shelters and buried under sand in the box.

In November moths began to emerge. Eggs laid by the females while in captivity were deposited high up on to the sides and top part of the box. The scales covering the eggs were "packed" into round, compact masses. The eggs and scales were stuck on to the box with some sticky substance.

## FROM FIELD AND STUDY

**Further Observations on the Irruption of Budgerygahs (*Melopittacus undulatus*).**—On July 28, 1951 a flock of about 30 Budgerygahs was seen at Clackline.

—J. A. L. WATSON, Nedlands.

On December 8, 1951 Budgerygahs were seen as we drove along the road between Bejoording and Northam. At about 24 miles west of Northam a group of four or more Budgerygahs was seen; and a few miles nearer Northam two more at different places about a mile apart were seen.

—(Mrs.) RICA ERICKSON, Bolgart.

**Narrow-billed Bronze-Cuckoo's Egg Embedded in Silvereye's Nest.**—After E. McCrum and I had the nest of a Silvereye (*Zosterops australasiae*) under observation at Bassendean and after the young had been successfully fledged, I collected the nest. This was taken on June 16, 1951, and it was not until January 12, 1952, after the nest had been handled and inspected on several occasions, that I discovered the egg of a Narrow-billed Bronze-Cuckoo (*Chalcites basalis*) embedded in its floor. The nest was of unusual depth, the lining of the floor being so thick that it made the actual nest cup quite shallow. The cuckoo's egg was almost wholly embedded in the lining, only a small portion protruding, though this portion probably had become uncovered during handling. The egg measured 17.4 x 12.9 mm., and was white sparsely marked with light red, or more correctly pink, around the larger end.

—D. N. CALDERWOOD, Claremont.